

# THE CONCEPTUAL BASIS OF MEASURES OF HOUSEHOLD WELFARE AND THEIR IMPLIED SURVEY DATA REQUIREMENTS\*

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This paper outlines a conceptual basis for the measurement and analysis of levels of welfare. It reflects the thinking that has been ongoing in the World Bank's Living Standards Measurement Study. Three alternative approaches to the measurement of welfare for the purpose of ranking households are surveyed, and the data requirements and analytical techniques for each highlighted. Various issues are discussed regarding the causal analysis of welfare levels and the changes in them. It is argued that the consideration of several dynamic aspects of welfare is significant for the identification of the poor and the potentially poor and for more accurate measurement of levels of living between socioeconomic groups.

## I. INTRODUCTION

The purpose of this paper is to outline a conceptual basis for the measurement and analysis of levels of welfare. The paper reflects the thinking that has been ongoing in the Living Standards Measurement Study (LSMS) which the World Bank launched in February 1980.<sup>1</sup> More specifically, it crystallizes the discussions that took place during a workshop held at the University of Warwick, May 25–29, 1981.<sup>2</sup> The topics discussed in this paper and the references quoted are selective, as this paper is not intended as an exhaustive survey of the literature on welfare and its measurement.

The LSMS is concerned with both the conceptual framework behind the measurement of welfare and the collection of the needed data. While a fair amount of the latter is ongoing at present, both statisticians and users recognize its imperfections and inadequacies; little dialogue takes place between data

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<sup>1</sup>The basic ideas behind LSMS and the need for it are explored in Pyatt (1979). The study's work program is described in Chander, Grootaert and Pyatt (1980).

<sup>2</sup>I should like to acknowledge the intellectual input of all the workshop participants into this paper: Ehtisham Ahmad, Sudhir Anand, Anthony Atkinson, Nancy Birdsall, François Bourguignon, Angus Deaton, Meghnad Desai, John Duloy, Mervyn King, Timothy King, Michael Kusnic, William McGreevey, John Muellbauer, Graham Pyatt, Jeffrey Round, Amartya Sen and Nicholas Stern. I am also thankful to Susan Cochrane and Wouter van Ginneken who provided comments on an earlier draft. The views in the paper do not necessarily reflect a consensus of the participants at the workshop but are merely my interpretation of the background papers and the discussions, interwoven with personal reflections. Although all participants were invited to provide comments and corrections to an earlier draft, and several did so, final responsibility for the contents of this paper of course rests solely with me.

producers and consumers. LSMS has been established, in part, to promote such a dialogue and to guide the data collection process towards producing data which could attempt to answer questions that catch the attention and interest of policy makers.

Such questions center around fundamental concerns about which groups in society are getting better or worse-off, and in which dimensions they especially do so. LSMS thus attempts to indicate which data need to be collected, which concepts are to be used in analysis, and what story the data tell about poverty and about the efforts of groups in society to improve their level of living.

An intermediate question is how to move from the concepts to the empirical stage, i.e. to the drafting of questionnaires usable in household surveys which can elicit the required information. It should be emphasized that the views expressed in this paper regarding conceptual issues take that "mission" of LSMS into account, i.e. the trade-off that exists between conceptual rigor and practical constraints on data collection and use is explicitly incorporated and will, in fact, be highlighted. Ultimately, the study is striving to come up with the simplest possible survey instrument, set of tabulations and analytical tools that will improve the data base in order to help answer questions regarding the changing levels of living between groups as a result of development policy.

This focus on the relative position of groups within a society and shifts in that position over time implies only a secondary emphasis on international comparability. Indeed, it is believed that the former is of primary concern to the national policy maker. Equally, the main concern of the World Bank's lending policy is the betterment of living conditions of target groups in society. It should not be overlooked though that efforts to better outline and define basic concepts, methods of data collection and presentation will tend to improve international comparability.

The plan of this paper is as follows. Section II outlines three approaches to the measurement of welfare and attempts to compare these from the perspectives of concepts used, data requirements, and analytical demands. The third section proceeds to issues that pertain to the causal analysis of welfare levels and the changes therein. Section IV discusses some implications of viewing welfare as a multi-dimensional concept; the time dimension will receive special attention. Section V explores the nature of the survey instrument required to obtain the data base for studying welfare and offers a few suggestions regarding data presentation. Finally, a short conclusion rounds off the paper.

## II. MEASURING WELFARE: CORE CONCEPT

LSMS is concerned with measuring welfare, not utility. Welfare and utility are related but not identical concepts: welfare derives from the consumption of goods, either directly or because of the characteristics of the goods (in the Lancaster sense, for example the transportation characteristics embodied in a bicycle). The translation of consumption into welfare units is a function of various physiological characteristics (age, sex) of the recipient and of environmental factors. However, throughout this paper it will be assumed that, *ceteris paribus*, a good bestows the same amount of welfare on an individual regardless of

personal psychological factors which may result in differences in the pleasure or utility that different individuals derive from the same good.<sup>3</sup>

We distinguish three main approaches to welfare measurement, each of which will be discussed in turn.

#### *A. Estimation of True Indexes of Welfare*

True indexes of welfare can be derived from the preference parameters estimated in an integrated model of household consumption and employment behavior. This approach is outlined by Muellbauer (1980). The basic premise is that welfare depends on goods, leisure, household composition and access to public services. These variables, with the exception of leisure, are seen as determinants of welfare at the household level; leisure is introduced in the welfare function at the individual level, i.e. the leisure/work choice of each potentially active household member is recognized.

The household maximizes welfare subject to a budget constraint which takes into account the prices of outputs and of purchased inputs, the time endowment of each household member, net accumulation of wealth, and the wage rate that each member can obtain in the market. The accumulation variable would be endogenous in an intertemporal context. However, if one is willing to make the assumption that preferences are separable in time, then the intertemporal optimization can be broken down into a series of static optimizations. This has the added advantage that it is not necessary to introduce assumptions regarding the degree of perfection of capital markets.

With this model, the goods/leisure choice and the choice between market and domestic work for each household member can be studied within the household context by estimating functions for (individual) labor supply, demand for commodities, and inputs into the domestic enterprise. This is a system of simultaneous equations which can be estimated from cross-section data using instrumental variable techniques. Based on the estimated parameters, welfare levels can be calculated and compared since the variables in the welfare function are all observable. Translation into money-metric equivalents is possible by using a reference price and wage vector.

The most obvious advantage of such a model is its completeness. It estimates welfare directly from the consideration of household behavior both on the consumption side and on the employment side. The model displays a flexibility on at least two important scores: First, it can easily be expanded to include schooling, which for household members in the relevant age bracket constitutes a fourth potential activity next to labor market participation, work in the domestic enterprise, and leisure. Second, the model is able to handle corner solutions, especially unemployment; however, here it is sensitive to the correct identification of the lack of labor market opportunity as opposed to voluntary non-participation. If the identification does not take place correctly, then biases can result in the estimated parameters.

<sup>3</sup>A similar distinction exists between welfare and utility derived from leisure and access to public services.

One suggestion in this context has been to rely on self-reporting of unemployment, i.e. to ask household members directly why they are not participating in the labor market—for voluntary reasons or because of lack of opportunities. An alternative solution is to introduce the concept of normal wage. This could be derived from a cross-section regression of wages on personal characteristics for those individuals who are participating in the labor market. The normal wage for non-participants would then be derived as the wage predicted by that equation for an individual with similar characteristics. Unemployment would be indicated by a situation where the normal wage is above the wage actually offered to the individual; voluntary non-participation would occur in the opposite case. It is clear that this econometric procedure is potentially subject to selectivity bias and that adequate testing for this would be required.

A model of the type described above is demanding in two respects. First, the econometric techniques involved are complex, especially if the participation decision is modeled as involving multinomial discrete choices. Second, the data requirements are quite substantial: they include complete information on hours and wages for market participants, the value of output from the domestic enterprise together with hours and other inputs, and time use data on other activities.

#### B. *Total Household Expenditures*

In contrast to the multi-equation simultaneous model discussed in the previous section, the approach to welfare measurement that relies on the estimation of total household consumption is essentially a one-equation model in which welfare is a function of goods consumed by the household. The key assumption here is that the preference patterns as revealed by the purchases of goods and services by the household implicitly take into consideration other preferences which in the previous approach were introduced explicitly in the welfare function: these include the leisure choice, the decision to have children, etc. In the present approach, these decisions are considered exogenous and it is assumed that the implications for welfare are fully reflected in the pattern of purchases by the household.<sup>4</sup> Welfare measurement is then a question of constructing an index of total expenditures deflated by an appropriate price index and by an index of household size and composition, i.e. an equivalence scale.

Ideally, the price index in question should be a true cost-of-living index. It has been demonstrated (Deaton 1980) that both the Laspeyres Index and the Paasche Index are first-order approximations to a true cost-of-living index. Specifically, the Laspeyres Index is an upper bound for the base referenced true cost-of-living index and the Paasche Index is a lower bound for the current referenced true cost-of-living index.<sup>5</sup> These approximations unfortunately

<sup>4</sup>Note that, in principle, welfare depends on *consumption* of goods. Since, in practice, household expenditure surveys record *purchases*, it is virtually impossible to obtain actual consumption from survey data. This would, in fact, require data on stocks of all non-durables at the beginning and at the end of the survey reference period. For durables, imputation of the consumption flow would require data on purchases and on the stock of durables (with information on age and expected lifetime). Therefore, expenditures are used here as a proxy for consumption.

<sup>5</sup>When preferences are homothetic, there is a *single* true cost-of-living index bounded by the Laspeyres and Paasche Indexes.

worsen when important price substitution effects appear, as is often the case in cross-sectional data. This provides an argument for constructing price indexes for different groups which are more or less homogeneous with respect to the prices they face. Distinctions that immediately come to mind are urban vs. rural and various geographic locations within a country. If prices also vary with income levels, then different price indexes could be constructed for different income groups. The case for this is strengthened since often quantity weights will also vary with income level and/or geographically.

We now turn to the issue of differences in household size and composition. An index number can be constructed which indicates at reference prices the cost differential for a household, due to different household size and composition, to reach the indifference curve of the reference household. Such an index number is known as an equivalence scale. If the reference household consists of a single adult then the equivalence scale can be thought of as representing a number of equivalent adults.

While several models of equivalence scales are available in the literature (for a general discussion, see for example Deaton and Muellbauer, 1980, chapters 7–9), a major problem is that they are all quite difficult to estimate and require large amounts of data, substantially beyond what one can expect to be available in most LDC (and even in DC) contexts. Fortunately, two simpler and less data-demanding approaches have been developed and applied recently to existing data sets.

The first one is based on Engel's law and assumes that the share of non-food items in total expenditures is a direct indicator of welfare (Deaton, 1981). In practice, the method requires estimation of an equation predicting the share of (non-) food in total expenditures as a function of total household expenditures or expenditures per capita, and various dummy variables reflecting the age and sex composition of the household. This equation is then solved to find the expenditure level that would give a household of a particular type the same (non-) food share as the reference household. The ratio of that expenditure level to that of the reference household is the equivalence scale. If expenditures also enter the estimated equation in quadratic form, the scale will vary with expenditure level. This method is analytically simple and straightforward and has the advantage that it incorporates economies of scale in household consumption.

A second approach to estimating equivalence scales was used in a recent article by Deaton (1981) and draws from Rothbarth (1943). It is based on the assumptions that commodities can be separated into child and adult goods, and that the expenditures on adult goods (at constant prices) can be used as a measure of welfare. Households with the same expenditures on adult goods are identified and the ratio of the total expenditures of a household of a given type to those of the reference type gives the equivalence scale. This method only allows comparisons of households with the same number of adults and does not incorporate economies of scale in consumption over all household members. For practical estimation the Rothbarth method requires the arbitrary identification of at least one adult good; others can be sought endogenously. The estimated scales, however, are in general not independent of the identification of the initial good.

Little, if any, experimentation has been done to date to explore the sensitivity of the scales with respect to that initial identification.

The basic problem with the Engel and Rothbarth methods is that they yield very different scales and the literature has not yet justified which method should be preferred, i.e. whether the non-food share or expenditures on adult goods is, in principle, the preferred index of welfare.

Ideally, the construction of equivalence scales should address more fully the issue of costs and benefits of children and the decision about the number of children. For this, a more complete model would be required including such aspects as fertility, education and intergenerational transfers. The real question is whether or not children are endogenous, and the answer depends essentially on the time dimension adopted to study income and welfare. If one uses income or expenditure over a one-year period, it is reasonable to consider children as exogenous. Lifetime concepts of income, however, would require them to be treated endogenously.

Accurate construction of equivalence scales also requires the collection of information on the income and income potential of children. Indeed, making the assumption that children's contribution to household income is zero when in fact it is positive would bias the scales since children would actually cost less than indicated by the scales. If a long-run time horizon is adopted, the insurance aspect of children should be incorporated. On the cost side, the uncertainty regarding many costs of children (for example health) should also be considered.

The data requirements for the approach to welfare measurement discussed in this section are good expenditure data, information on the household composition and price data. While the former two are standard outputs of any household expenditure survey and, in fact, constitute the major purpose of taking the survey, the collection of price data is a less clearcut undertaking. The question can be raised whether price data should be collected at the household or at the community level. Prices are known to be subject to stochastic variations. Since over a longer time period or within the context of a group of households such as a socioeconomic group such stochastic variations probably largely cancel out, it may be better to try to obtain average or "normal" prices. These may conceivably be collected at the community level; this could be accomplished, for example, by taking a price survey of various stores or market vendors, or by using a panel of consumers.

### *C. Full Income Concept*

Full income is the sum of monetary income, income in kind (including production of the household enterprise and government services), and the value imputed to services derived from endowments and assets such as durables, housing and time owned by the household. The method attaches a monetary value to leisure based on behavioral decisions by the household and its members to equate the utility of time spent on various activities at the margin. The full income method can be seen as a reduced-form equation of the complete behavioral model described in section A. An interesting empirical application of the method is presented in Kusnic and Da Vanzo (1980).

The value to be used for imputation of time is directly linked to available opportunities, and the full income method crucially depends on correct estimation of the real opportunity set. For example, one can impute the value of  $h$  hours of, say, cooking at opportunity wage rate  $w$ , as  $h \times w$  if, and only if, one can sell the  $h$  hours at  $w$  if one so chooses. Caution is required when assuming that the same full opportunity set exists for everyone and doing all imputations at existing market wage rates. In practice, not all leisure consumption is bound to be voluntary and the failure to recognize this can result in seriously over-estimating (actually, over-imputing) welfare. In principle, when quantity restrictions apply, the shadow value of time must be derived from a modeling exercise at the household level, as described in the section dealing with true indexes. However, an investigation of work opportunities at the local level may be a more practical way to obtain an indication of the opportunity wage rates for the community to which a household belongs.

It would seem useful to do sensitivity analysis over varying opportunity wage rates and varying real employment opportunity sets to see how robust the full income measure is in identifying the poor or poor groups in society. Related to this is the question of how much time should be allotted daily to an individual for allocation other than sleep. Again, the full income measure is sensitive to this and the identification of the poor may be affected.

Two potential difficulties can arise in the application of the full income method. First, careful imputation of the value of publicly provided goods is necessary, especially when the provision alters the distribution of time spent on various activities. For example, if a well is built in a village, hours spent on water transportation will decline, but the full income measure may remain the same if leisure is valued at the same rate as household work. Conceivably it would even decline if leisure is valued at a lower rate than time spent on productive activities, even though one would easily agree that the installation of the well is a welfare improvement. Second, in order to perform the imputation for non-market activities a sufficient amount of information on market activities is required, and in virtually all instances testing for the presence of selectivity bias will be required.

In terms of data requirements imputations of the sort needed to compute full income require accurate accounting of hours spent in various activities. The crucial question from a practical viewpoint is how far one should go in selecting items to be included in the imputation. To some extent this is a matter of survey cost, since it depends on the amount of detail (distinction of various types of activities) with which one wants to collect time-use data.<sup>6</sup>

Considering the generally high cost of collecting time budgets, one may wish to experiment with an alternative approach which would consist of simply asking household members whether or not they have done a particular activity during the previous day or week (i.e. a checklist with yes/no answers, or, at

<sup>6</sup>Although not unique to applications of the full income method, it is worthwhile to mention the interpretation difficulty of time use data if no concomitant information is available on intensity of work or of performing any given activity. One study, for example, found that farmers actually worked more hours in the agricultural slack season. The explanation obviously lies in differing labor productivity per hour. However, intensity of work is a notion that largely escapes current theoretical modelling efforts.

most, simple qualifiers such as much/little time spent ). There is a fair amount of stochastic variation across individuals in the amount of time spent to perform a certain task. One may not wish to capture that variation and instead obtain an average for the community as a whole of the time spent on various activities. This method would require a careful definition of the activities and would be most suited for activities that can be broken down into specific tasks. Examples are farm work, house building and repairs, fetching water, cooking meals, etc. which can all be fairly precisely described in the context of a given community. The community averages obtained in this way could then be added to the checklist of activities available for each individual to obtain the time budget.

In summary, while the full income method is in some sense derived from the more complete modeling approach described in Section A, and while it is definitely computationally easier, it nevertheless still has very substantial data requirements. The key problem to be solved is the identification of the real opportunity set faced by potential labor market participants, i.e. identification of the shadow wage rate needed for imputation. Taking short-cuts by introducing unverified assumptions regarding the opportunity set can produce seriously misleading results. It is, for instance, not inconceivable that the failure to do any imputation (i.e. imputing zero value) would be a smaller error than using a particular market wage rate to do the imputation. In other words, the computational attraction of the method is to some extent offset by its sensitivity to incorrect identification of real opportunity sets.

#### D. *Conclusions*

It would seem that from the three approaches for measuring welfare discussed above, the first one, i.e. the estimation of true indexes of welfare, is conceptually superior in that it relies on a complete set of behavioral equations depicting households' consumption and employment behavior in order to derive welfare. The full income approach is in some sense a simpler version of this approach in that it relies on a particular reduced-form equation derived from it. The second approach seems to require the strongest assumptions in that it looks only at household expenditures, albeit corrected for price changes and differentials in household composition, in order to measure welfare and to rank households.

The true index approach infers preference orderings from observed behavior and uses these to compute a scalar measure of welfare. The two other approaches use monetary and imputed flows without specific assumptions about preferences. The full income method measures welfare according to consumption that would be attainable if the household were to sell its entire leisure endowment, thereby assuming marketability of the latter. The expenditure method takes actual consumption (approximated by actual expenditures) as welfare measure. Correct application of the full income and expenditure methods requires deflation of the welfare measure with a price index (including the price of leisure in the case of full income) and an adult equivalence scale.

The differences between the three methods can be illustrated as in Figure 1.<sup>7</sup> The true index method is given by  $OA_1/OB_1$  the ratio of the welfare index

<sup>7</sup>I am grateful to John Muellbauer who suggested this figure.



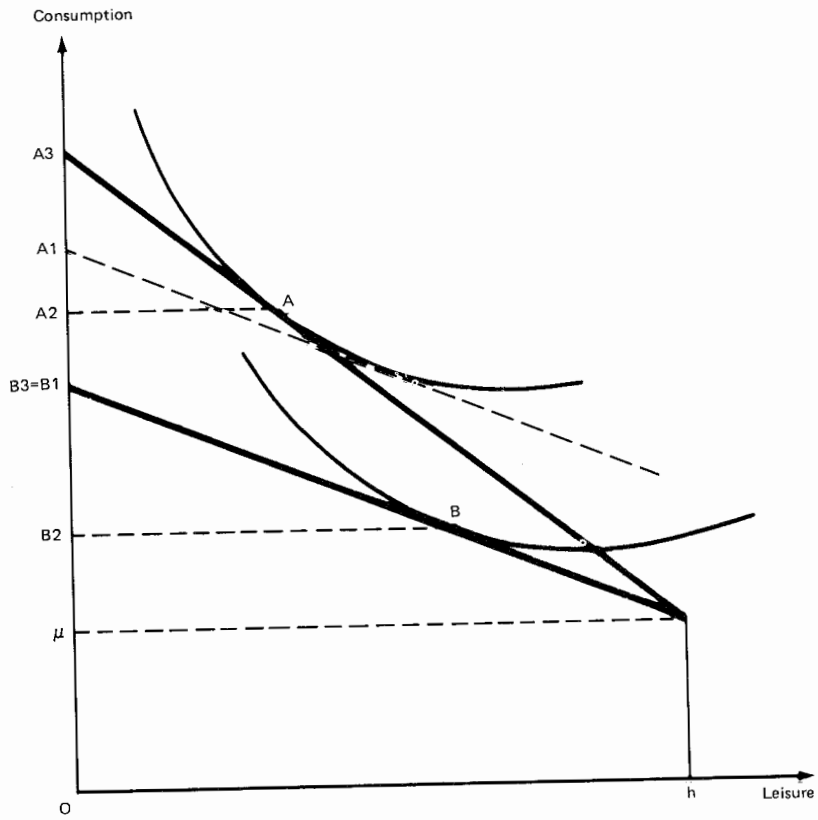


Figure 1

at  $A$  to the welfare index at  $B$ , using the wage rate of  $B$  as reference. The expenditure approach is given by  $OA_2/OB_2$ , the ratio of the actual expenditures. The full income method uses

$$OA_3/OB_3 = OA_3/OB_1 = (\mu + w_B h) / (\mu + w_A h),$$

where  $\mu$  is the non-labor income,  $w$  is the wage rate, and  $h$  is the time endowment.<sup>8</sup>

From a practical viewpoint all three methods suffer from potential biases due to inadequate data, and the data requirements themselves vary greatly among the three methods. If strong relative price effects are present, the expenditure approach should be applied within groups which are relatively homogeneous regarding the prices they face, which implies increased data requirements. True indexes and the full income method are very sensitive to correct identification of opportunity sets and therefore suffer from potentially serious imputation biases, from selectivity and self-response biases. Especially the true index method exhibits quite excessive data requirements. In choosing among the three methods, it remains a matter of empirical judgement as to which of the above-mentioned deficiencies is least likely to harm the analysis one wishes to undertake.

The choice among the three methods is also linked to the debate about income vs. expenditures as the core of welfare. This debate arises, in part, from the finding based on household survey data that household expenditures tend to exceed household income for typically 80–90 percent of the population. This obviously implies inaccurate measurement of either or both variables and/or is a result of not using lifetime concepts (which is also really a measurement issue). Generally, the consensus seems to be that expenditures are easier to measure and tend to be more accurately reported. They are also less subject to fluctuations than income, and in the context of the permanent income and life-cycle models they can be considered a proxy for income.

However, the dichotomy of collecting income data versus expenditure data for the purpose of measuring welfare is, in fact, a false one in the framework of the Living Standards Measurement Study. Both types of data are indeed needed, since the concern of LSMS is to identify poverty with the objective of specifying policy intervention that may improve the level of living of the poor. The question of causality can, therefore, not be avoided. Inasmuch as consumption provides the core measurement of the level of living, the question immediately arises as to how it is financed, i.e. who earns the income, what are the sources of income, what are the endowments available to the household in terms of land and human capital? Related issues, such as the lack of complementary assets, need to be addressed as well. Ultimately the information one needs is a vector of characteristics of households that is operationally meaningful, and that explains how the household has realized a particular point in its opportunity set. Such a vector requires data on income, assets, schooling and work experience, and demographic and socioeconomic characteristics of the household.

<sup>8</sup>Note that these measures need to be further deflated with the appropriate price index and equivalence scale.

### III. CAUSAL ANALYSIS OF WELFARE: SOURCES OF INCOME

The analysis of the causes of poverty requires a careful investigation of the sources of income which provide the means for consumption by households.

Income can be disaggregated into earned and unearned income; the latter requires information on ownership of assets. Where non-financial assets are concerned, an imputation of the income flows derived therefrom will be necessary if the asset is used by the owner. In the cases of land, livestock, agricultural equipment, etc., their contribution to income can be studied within the framework of agricultural production functions. This requires, however, detailed information on all inputs of the household agricultural enterprise.

Perhaps one of the major sources of unearned income in the developing country context is owner-occupied housing. In urban areas, the rent for these houses can be imputed via estimation of hedonic rent equations for rented units. After appropriate testing for selectivity bias, the estimated parameters of such an equation can be used to impute rent for owner-occupied units. In rural areas, the imputation may be more difficult if no rental market exists (it is unlikely that the parameters of a hedonic rent equation for urban areas would be suitable for imputation in rural areas).

The information necessary to estimate hedonic rent equations includes physical characteristics of the house (type of construction material, age, number of rooms, etc.), amenities available (piped water, sewage, electricity, etc.), type of tenure arrangement, and location (with respect to work place, central city area, local market, etc.)

The study of earned income involves the analysis of decision-making on the part of each household member as to whether he/she will participate in the labor market. Participation is used here in a broad sense: it includes employees, unpaid family workers, the self-employed and employers. The term thus refers to how each household member will use his/her resources, all or not combined with household resources, to generate monetary income and/or to produce consumption items in kind. This decision-making process is quite an intricate one. On the one hand, the act of participation itself is an individual activity and is implemented by each household member separately; on the other hand, the decision to participate is in some sense situated at the household level, and characterized by interaction between the different household members, especially between the member whose participation is being considered and the household head. Decision models of household behavior must take into account this interdependence between members, as well as the interplay between individual variables and variables reflecting the household's condition.

An important aspect of the outcome of this decision-making process is the proportion of household income that is obtained in cash. The changes in the ratio of monetary to non-monetary income over time and the comparison of that ratio among different socioeconomic groups or regions is a useful way to assess changes and differences in the degree of development and in the degree of availability of market opportunities in particular.

Without going into the vast literature on labor market models, of which participation models are but one aspect, we would like to suggest two broad

approaches to modeling labor market participation in the household context. The first one, discussed earlier, consists of an integrated model of employment and consumption behavior at the household level. The second approach models participation separately. One way of doing this is to consider participation as a sequential series of decisions more or less along the lines of the following sequence (see for example Desai and Edison 1980). First, the household member decides whether or not he will participate in the labor market. If he decides to do so he must then determine his employment status. A third step involves the choice of occupation, and the decision whether he wants to exercise that occupation in the formal or informal sector. This decision-making tree results in a number of groups of individuals. For each group an earnings function can be estimated to explain the level and possibly also the composition of income.

An alternative approach is to segment the labor market according to a number of household and individual characteristics. It is possible to construct a matrix that maps household on individual characteristics. For example, household characteristics could be race, location, whether or not the household owns an unincorporated enterprise, and the number of members in the labor force. The individual characteristics could consist of sex, age, sector of employment, employment status, status within the household, and occupation (Edison and Desai, 1981). For each cell of such a matrix an earnings function could then be estimated. The interesting aspect of both approaches is that they emphasize the position of the household member within the household and the interaction of individual and household variables, two factors which are crucial in the modeling of the participation decision.

Participation models require data on the sources of income for each household member for each job held. When dealing with the self-employed, a complete account of inputs and outputs is necessary. The distinction between informal and formal sectors requires adequate identifiers. Decision-making models will econometrically require logit estimation which, in the case of multinomial choice, requires sophisticated software. A major econometric tool for using income data to analyze the causes of poverty is the estimation of earnings functions. Such equations regress total or part of income (or even income composition, for example, wage share) on variables such as hours worked, occupation, schooling and work experience, other individual and household characteristics, whether the participant is in the formal or informal sector, etc. Such an equation is, in fact, a reduced form of a complete model of labor supply and demand.

In the modeling of labor force participation, corner solutions are extremely important. The decision-making chain identified above must at all stages take into account the true opportunity set; otherwise, the estimated parameters could be biased or, worse, the interpretation of equations could essentially become meaningless. It is clear that when no opportunities exist, the decision equation as such has no content. It is only meaningful to estimate decision models for those household members that truly face choices. While this point is conceptually very obvious, it is by no means trivial empirically. It is evident that the welfare implications of the two situations are vastly different, as are the policy recommendations that can be derived from the models.

Finally, the information on income, education, personal and household characteristics that is collected via a household survey all reflects the supply side of the labor market; collecting some information on the demand side would also be very valuable. Conceivably, this could be accomplished at the community, district, and/or regional level. Such data would shed light on available opportunities, and when collected in repeated surveys, indicate how these are changing over time. Contrasting this data with household's perception of labor demand and opportunities (which could be asked directly of household members) is likely to give a better insight into the participation decision-making process, and identify where information bottlenecks may exist.

#### IV. WELFARE AS A MULTI-DIMENSIONAL AND DYNAMIC CONCEPT

It was suggested in the previous sections that information on expenditures and on income and assets can serve as the core of welfare measurement and of causal analysis, respectively. Households can be ranked on the basis of their total expenditures (appropriately deflated), while income and assets are the key variables necessary to analyze the sources of varying levels of welfare. There are, of course, many other components of welfare; the latter is, as this section will attempt to indicate, in a very fundamental sense a multi-dimensional concept.

The first and most apparent direction in which the basic dimension of welfare can be expanded entails human development indicators such as health, education, nutrition, fertility, infant mortality, etc. Pertinent issues here include access to various public services (schools, health facilities, piped water, etc.). These issues are not explored further in this paper because in the context of LSMS an expert group meeting was organized in the fall of 1981 during which these particular dimensions were discussed. Some of the conclusions of this meeting are reported in Ho, McGreevey and Meesook (1981).

Explicit consideration of time is a second dimension in which the basic welfare concept can be enriched. Relevant issues that immediately come to mind are fluctuations of income both in the short term and over the life cycle, the vulnerability of the household to external shocks, the accumulation of assets, intergenerational transfers (bequests), etc. The following three subsections will address some of these points.

##### A. *Stochastic Short-term Variations*

Both income and expenditures are subject to fluctuations. The distribution of the residuals in, for example, estimated food share equations clearly shows that measured expenditures as an indicator of welfare are subject to considerable noise because of stochastic short-term variations. Extreme residuals can usually be explained by occasional expenditures such as weddings, festivals, etc.

Muellbauer (1981) proposes a method to separate out long-term and short-term variations based on the permanent income model. The method consists of estimating income and expenditure equations using explanatory variables that are recognized to have specific long-term implications and to be proxies for permanent income, such as housing characteristics, access to amenities, age

composition of the household, educational achievement of household members, and ownership of productive assets. In principle, this allows the systematic part to be extracted from the variation in income and expenditures, thereby eliminating the non-interesting stochastic part. A major advantage of the approach is that the analysis can easily be performed separately for urban and rural areas, for socioeconomic groups or types of household composition.

The question was raised earlier whether price and wage variables should not be collected in the frame of a community level survey in order to obtain “normal” or average values, thereby eliminating stochastic fluctuations in them. The possible counterargument to doing so, viz. that these price and wage variations are part of the real world and faced by the poor in their daily budget constraints, meets an objection in the substantial modelling difficulties that exist if such variations were to be incorporated in models of household behavior. In addition, when the emphasis is on comparing socioeconomic groups, the main interest is in observing fundamental, i.e. non-stochastic, differences in prices and wages faced by different groups. Equally, for over-time comparisons, the concern is with trend lines rather than movements around them.

### *B. Asset Accumulation*

An important aspect of introducing a time dimension in the concept of welfare is accumulation. A study of the process of asset building requires information on three levels. First, at a given point in time, one needs to identify which households, or which groups in society, are saving. This indicates where the potential exists for accumulation, i.e. for increasing the opportunity set that a household or a group of households face. Second, one must determine whether savings are used to buy productive assets or household durables, or whether they are maintained as financial assets. These three alternative forms of investments hold different potential for increases in income in the future. Third, one can observe how the stock of assets changes over time; clearly, the growth in assets is not independent of the choice the household makes regarding the types of assets it holds.

The study of accumulation is particularly important in view of capital market imperfections that prevail in most developing countries. Indeed, many households cannot escape the poverty trap because of their inability to borrow. Identification of these households is an important ingredient in the formulation of anti-poverty policies.

For data collection purposes one can obtain savings figures as the residual on the household balance sheet, or inquire about the acquisition of assets (i.e. obtain the information on the investment side). The latter approach is likely to be more feasible since the types of asset holdings open to a household in a developing country are typically fairly limited; thus direct asking by means of a checklist becomes possible. In addition to acquisitions, a list of present asset holdings is necessary in order to complete the information.

It is open to query whether it is sufficient to obtain a list of assets, or whether value information should be gathered as well. The latter is substantially more difficult and costly to acquire and problems of respondent resistance and/or

ignorance are likely to occur. It would seem that for most analytical purposes discussed in this paper (for example, long-term vs. short-term fluctuations, earnings analysis), it is essential to have item information on assets. Value information, on the other hand, seems optional: it is an empirical matter whether its marginal contribution to the explanatory power of the models in question is worth the added cost of gathering.

Equally, in terms of over-time comparisons, it is of prime importance to distinguish the households that are accumulating from those that are not. Item information is adequate to establish this distinction and to observe trends. It seems quite feasible to ask households whether they owned any of the items they presently have a number of years ago, or whether they have lost any assets in the recent past. Considering the relative rarity and the importance of assets in the life of most low income households, such questioning would not encounter major memory problems. However, the cost of obtaining information on changes in the level (value) of assets may, again, exceed the value of its contribution to the identification of the poor and to the understanding of poverty mechanisms.

### C. *Vulnerability*

As soon as one departs from the static frame of thinking, the issue of uncertainty about future incomes and vulnerability of the household arises. This issue is, to some extent, independent of the existence of perfect capital markets because borrowing and/or insurance involve costs (interest, transaction costs). The degree of imperfection of these markets is, however, an indicator of how important it is to consider variability in income receipts.

The importance of variability in receipts and the implications for welfare of the absence of intertemporal capital markets also depends on the absolute level of income. It has long been recognized that rational decision-making under uncertainty is influenced by the farmer's production level. Specifically, a small farmer whose output is barely above his household's subsistence level will be reluctant to adopt a potentially yield-increasing technological innovation if it also increases the variability of his output to the extent that adverse weather conditions might drop his output below the subsistence level. This holds true even when the innovation would yield a higher average output over a number of years. In other words, vulnerability or its perception by the farmer reduces his choice space and hence his welfare.

An interesting analysis of vulnerability in the event of calamities (specifically famines) was done recently by Amartya Sen (1979, 1980). He demonstrates convincingly by analyzing four famines that starvation due to famine is not necessarily caused by a decline in food availability and, in fact, generally is not; rather it is due to inadequate entitlements (opportunity sets). Sen distinguishes between an initial endowment reflecting a person's originally owned assets and his exchange entitlement mapping which indicates his ability to purchase alternative commodity bundles via the available means of exchange in the economy. Starvation from famine can be caused by a direct entitlement failure (the farmer's own crop fails and he has no other assets to buy food), or by a trade entitlement failure (when the food price in terms of one's own labor or production rises).

Note that the one can lead to the other: a crop failure can result in a drop in demand for rural labor, i.e. a drop in rural labor's wage expressed in food units. Clearly then, from the perspective of identifying the poor, it is essential to identify those who are potentially vulnerable to unfavorable entitlement changes. Regardless of how one calculates income or expenditures, neither is able to capture the above described aspect of vulnerability.

For purposes of LSMS, the key question is whether one can identify, *a priori* and via data gathered in a household expenditure survey, the relevant entitlements and endowments. Information is needed on occupation, land ownership, net producer or consumer status of major staple foods, and whether the household owns any commodities or assets that can be sold for cash. The endowment of human capital of the household is also relevant as a safeguard against future entitlement failures. Vulnerable groups include rural landless laborers, unskilled workers in urban areas, part-time workers, and informal sector self-employed, all of whom would suffer from trade entitlement losses in the case of rising food prices. It would seem that a large amount of local knowledge is required to correctly identify the groups with vulnerable entitlements.

Clearly, the entitlement approach is useful not only for the study of major catastrophes such as famines but also for identifying, for example, victims of swings in labor demand in urban areas, of general economic up and down turns, etc. It is to be studied in the overall framework of mechanisms of protection that the poor use in case of income fluctuations (for example, remittances). The entitlement approach is especially useful when analysis is done by socioeconomic groups: one can identify for each group the principal sources of income, endowments (especially assets which could be sold in calamity conditions), and available skills. A check on vulnerability is then possible, and high risk groups can be identified.

Although, in principle, the vulnerability aspect of welfare could be incorporated into models of household behavior, it is not proposed to do so, given the already complex nature of such models and given the still experimental state of analysis of the entitlement approach. At this stage it seems more useful to merely flag high risk groups by presenting information on their relevant entitlements next to the data on expenditures and income.

When discussing vulnerability, one must recognize the special role played by remittances. Indeed, for the study of welfare and poverty, it is necessary to go beyond the household and to investigate the system of gifts and transfers that flow between households. For this purpose it may be best to look at villages or at least clusters of living quarters. (This obviously has implications for sample design.) A household may be poor if it has a low income, but the situation is aggravated if it does not belong to any network of social support. The key problem is the correct delineation of the network of support that exists (extended family, village). This requires the collection of information on the source of the remittance (location, relationship between giver and recipient, income level).

From the point of view of assessing vulnerability, the stability of the transfer flow is crucial. The perception by the recipient of the degree of certainty of the transfer can significantly affect his consumption and employment decisions. Such information will shed light on the efficiency of these internal markets of



remittances (as opposed to the external or formal capital/insurance markets). Knowledge of the motivation of the remittance is useful to assess the main role of the support system, viz. whether it serves as an informal capital market or insurance market. (For example, are remittances from urban migrants to the rural relatives they left behind essentially contributions to the latter's income or merely an insurance premium to remain part of the rural network of support?)

From the viewpoint of data collection, accurate information on remittances is very difficult to obtain and requires a good rapport between the interviewer and interviewee. Household surveys may not necessarily be the best way to establish such a rapport. Also, the willingness of individuals to reveal this sort of information will differ in different countries and be influenced by cultural factors. These points might potentially make an argument for investigating this issue as a special study, perhaps on a smaller scale, rather than trying to incorporate such a line of questioning into a general household income and expenditure survey. If one does so, however, it is crucial to ensure that the special studies can be linked up with the core variables of the survey.

## V. MULTI-PURPOSE HOUSEHOLD SURVEY

### A. *Data Collection*

Recognizing that welfare is a multi-dimensional concept has implications for surveys. Specifically, a multi-purpose household survey will be necessary to capture the different dimensions of welfare. A central core of questions can solicit information on expenditures and income and various modules can be attached to it, each of which can ask about a particular dimension of the welfare concept.

There is no implicit need that the households covered by each module be the same as those covered by the core. Some modules may in fact require larger samples (for example, infant mortality because of the relative rarity of the event involved), while others, due to their specialized nature and difficulty in obtaining the information, may be limited to smaller samples (obvious examples would be household support systems and time budgets). What is required, however, is that the modules can be linked up with the core, i.e. there has to be some overlap in terms of households and/or in terms of tracking variables so that matching can be done either at the individual or at the group level.

It is clear that adding modules to the core will increase the cost of the survey. A trade-off must therefore be made between marginal survey costs and the benefits from adding more dimensions. To that end, the latter should be ranked according to some priority rule. This ranking and the nature of the resulting trade-off will depend on local resources and on preferences and requirements of local decision makers. The entire process will have to take into account the constraints imposed by the capabilities of national statistical offices.

At various places earlier in this paper, it was mentioned that a number of variables might be more usefully collected at the community level rather than at the household level. A practical problem in conducting community surveys is the identification of one or more suitable respondents who are qualified to

provide the requested information. The experience of various surveys such as the Malaysian Family Life Survey which collected substantial amounts of community level information may prove useful in this regard (see Omar, 1978). Using community level information also has implications for the sample design; specifically, cluster sampling may prove to be a useful technique.

Since one of the major objectives of LSMS is to trace changes in welfare over time, it would be extremely helpful if respondents would be able to provide retrospective life history data.<sup>9</sup> Experience in the Malaysian Family Life Survey indicates that retrospective data on schooling, training, and work experience is of good quality and extremely useful for analysis (Smith, 1981). Equally important for some of the analyses that were suggested earlier would be the collection of retrospective data on location in order to study the migration decision, and on housing conditions and ownership of durables and productive assets in order to try to make statements about trends over time. It is unlikely, though, that retrospective questioning would be useful for detailed consumption and income data.

## *B. Data Presentation*

Within the framework of LSMS, the presentation of data can be envisaged on three levels: a basic set of tabulations, social accounting matrices, and various measures of poverty.

The complaint is often heard that the set of tabulations produced by national statistical offices in their reports on household surveys is not immediately useful for policy analysis and recommendations. It is, therefore, considered a major task in LSMS to construct a basic set of tabulations in such a way that that purpose could be fulfilled. The focus would be to present data along dimensions which have a direct relevance for policy intervention in areas relating to living standards.

The multi-dimensionality of the welfare concept is reflected in the core-with-modules structure of the questionnaire, and should also be made evident in the tabulation plan. The core information (expenditures, income, assets) must come out in the foreground and the human development variables, vulnerability indicators, etc. must be clearly linked to the core variables in subsequent tables along relevant dimensions. Within the core information tables, it would be useful to distinguish between cash and imputed components of the variables since the margins of confidence may not be the same for the two types of data.

The operational issue of concern to LSMS is the distribution of levels of living over various socioeconomic groups in society as well as the changes over time in the relative position of such groups. While the precise definition of such groups must remain flexible and be suited to local conditions and policy issues, several classification criteria are bound to be widely applicable, such as location, ethnicity, endowments in terms of land and human capital, and employment

<sup>9</sup>All data gathered in a survey is retrospective. The term as used here refers to questioning about the past beyond the customary recall periods (say, one year at most) in order to obtain longitudinal information from the household. The method is an alternative to panel surveys. The main advantages are lower cost and immediate availability of the results. The major potential drawback is the uncertainty about the accuracy of the responses.

status.<sup>10</sup> Aspects of market segmentation (for example, housing market, labor market) would also provide useful criteria.

Once the population is classified into socioeconomic groups, over-time changes in levels of living will be reflected in changing average expenditure levels (and in changes in other indicators) within groups, as well as in a changing population structure across the groups resulting from mobility. The data presentation will have to highlight both facets.

Since the basic set of tabulations will not cover the complete demand for results from the survey by policy makers and other users, it is important that the data be stored in a computer file in a structured and easily accessible way so that additional tabulations can be quickly produced. To facilitate analysis by users who were not directly involved in the data collection, the importance of adequate documentation cannot be overemphasized. Complete information on definitions (including changes since previous surveys), sampling procedure, non-response, imputation rules, and a description of the structure of the data file (with definitions of all created variables) constitute the bare minimum of what should be available to users.

A special tabulation which can combine a tabular format with an analytical model is the social accounting matrix (SAM): it essentially describes the financial flows that take place within and between various institutions and sectors of the economy, each of which can be disaggregated according to local conditions and local relevance. Of specific importance for welfare analysis is that the SAM format allows the disaggregation of the household sector and is flexible enough to admit alternative household groupings to suit the specific needs of analytical and policy issues.<sup>11</sup>

The major data base in most countries today is the System of National Accounts (SNA). In this system, the consumption figures are generally residuals. The emphasis of LSMS on high quality household expenditure surveys can considerably improve this situation and provide a micro data base for more accurate estimation of the consumption component in the SNA. The SNA as it stands at present does not concern itself with income distribution. The integration of the disaggregated household sector, as presented in the social accounting matrix, into the system of national accounts will incorporate income distribution into this main data frame, thereby highlighting the links with the production structure and indicating from where households derive their income. Thus, since the framework takes into account income and the sources thereof, the SAM format provides a direct clue to answering the question, who is benefiting from economic development and why.

A customary way to present data on levels of living is under the form of poverty measures. One type of poverty measure emphasizes relative inequality (for example, income share of the poorest two population quintiles); a second

<sup>10</sup>The distinctions along geographic and ethnic lines will substantially influence the size and stratification of the sample. This suggests that one must know what cross-tabulations and analyses will be done on the data prior to survey taking and even prior to sample design.

<sup>11</sup>For general background reading on SAMs, see, for example, Pyatt and Thorbecke (1976), Pyatt and Round (1977). A recent review of LDC experience with SAMs is given in Round (1981a). The use of SAMs as a tool in the measurement of living standards is discussed in Round (1981b).

type attempts to capture absolute poverty (head count of the number of people below a poverty line; poverty gap). Some measures, such as the Sen measure, combine aspects of both absolute poverty and inequality. These poverty measures, like the data on which they are based, are subject to sampling and measurement error. It is therefore important that, in publications and reports, they are presented with an indication of their level of accuracy, for instance by giving a confidence interval. This is especially useful when assessing over-time changes in poverty measures. Since such changes are typically small it is essential that information be provided establishing whether or not the observed change is statistically significant.

Absolute poverty measures require the definition of a poverty line. The position of such a line is to some extent a matter of subjective judgment; hence, it would seem useful to present poverty measures together with the results of a sensitivity analysis to see how shifts in the poverty line affect various measures. A discussion of the sensitivity of poverty measures and of the implications of sampling and measurement error in the data is found in Atkinson (1981).

## VI. CONCLUSION

This paper has surveyed three alternative approaches to the measurement and analysis of welfare, reflective of the thinking that has been ongoing in the World Bank's Living Standards Measurement Study (LSMS). The first approach advocates the derivation of true indexes of welfare from the preference parameters estimated in an integrated model of household consumption and employment behavior. The second approach uses total household expenditures deflated by a price index and an adult equivalence scale as a measure of welfare. The third approach consists of the calculation of full income for households.

The expenditure and full income approaches measure welfare using monetary and imputed flows without specific assumptions about preferences and are in a sense shortcut versions of the first approach. While they can therefore be seen as conceptually less complete they do have the advantage of requiring substantially less data. The choice of approach must be based on a careful investigation of the trade-off that exists between conceptual rigor and practical constraints on data collection and use.

The paper discussed various issues regarding the causal analysis of welfare levels and the changes in them. Special emphasis was given to the links of the household with the labor market. Throughout the paper, the implications of the suggested approaches for data collection and data analysis were highlighted.

It was argued that welfare is fundamentally a multi-dimensional concept. Attention was given to three dynamic aspects of welfare: short-term stochastic variations, asset accumulation, and vulnerability of the household. The consideration of these aspects is significant for the identification of the poor and the potentially poor and for a more accurate measurement of the levels of living between socioeconomic groups.

Finally, a few words were said about the multi-purpose household survey that is needed to gather the data for description and analysis of welfare levels,

and some principles were discussed about data presentation. A main concern of LSMS is to make the latter more directly relevant for the decision maker.

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